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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/046,864

01/13/2002

Steven Teig

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5504

23349

7590

05/24/2004

STATTLER JOHANSEN & ADELI

P O BOX 51860

PALO ALTO, CA 94303

EXAMINER

LIN, SUN J

ART UNIT

PAPER NUMBER

2825

DATE MAILED: 05/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/046,864

Applicant(s)

TEIG ET AL.

Examiner

Sun J Lin

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02/09/2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27,28,32-34 and 38-40 is/are rejected.
- 7) ☒ Claim(s) 29-31 and 35-37 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 02/09/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to applicant's Amendment and Remarks filed on 02/09/2004 regarding application 10/046,864 filed on 01/13/2002. Claims 27 – 40 remain pending in the application.

Claim Objections

2. Claim 35 is objected to because of the following informalities:
Claim 35, line 6, before "routes" insert —potential—.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

- (1). Determining the scope and contents of the prior art.
- (2). Ascertaining the differences between the prior art and the claims at issue.
- (3). Resolving the level of ordinary skill in the pertinent art.
- (4). Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 27, 28, 32 – 34 and 38 – 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,295,634 to Matsumoto in view of U.S. Patent No. 5,587,923 to Wang.

5. As to Claim 27, Matsumoto shows and teaches the following subject matters:

- A wiring design apparatus which automatically designs a wiring of a printed circuit substrate or a wiring between bonding pads on a semiconductor chip – [col. 1, line 12 – 18];
- Prepare attributing elements (i.e., pre-computing attributes) for wiring (i.e., routing for nets) process – [Steps S260, S130 in Fig. 26];
- Partitions of a region of a design layout, containing a plurality of elements, into a plurality of (triangular) sub-regions, wherein a plurality of triangulated edges exist between the triangular sub-regions – [Fig. 7; Step S144 in Fig. 28]; Notice each (triangular) sub-region has a contact pin associated with it;
- For a first set of (triangular) sub-regions (e.g., (triangular) sub-regions in the left portion of Fig. 18), identifying a first set of wirings (i.e., potential routes) (e.g., dashed lines connecting between contact pin 0, 1, 2 and 3 in the first set of (triangular) sub-regions, wherein each route in the first set of provisional routes traverses the first set of (triangular) sub-regions – [Fig. 18]; and
- For each particularly selected triangular edge (i.e., particular edge), judging (i.e., identifying) an available capacity, that is the number of routes in the first set of potential routes allow to intersect the particular triangular edge, is exceeded (i.e., too congestive) – [Steps S322, S324, S326 in Fig. 34A].

Matsumoto does not teach relationship between edge-intersect capacity and edge-intersect cost that is dependent on the number of routes in the first set of potential route. But Wang teaches that edges with larger (available) capacity have higher probability of allowing wires (i.e., routes) to go through, and available edge capacity provides a strategy in setting edge cost (i.e., edge-intersect cost) – [col. 8, line 22 – 27]. Notice that the available capacity of an edge is dependent upon the number of wires (i.e., routes) that already intersect (i.e., pass) the edge. For an edge having a lower number of potential routes, its available capacity is higher and its edge-intersect cost may be set to a lower value; whereas, for an edge having a higher number of potential routes, its available capacity is lower and its edge-intersect cost may be set to a higher value. Therefore, the edge-intersect cost of an edge is proportional to the number of potential routes that intersect that edge. Notice also that the edge-intersect

cost is a useful parameter for estimating the available capacity of an edge for use in arrangement of potential routes in order to avoid possible congestion to the edge under study.

Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have used the teachings of Wang to utilize edge-intersect cost as a parameter in estimating the available capacity of an edge in arrangement of potential routes in order to avoid possible congestion to the edge.

Since the edge-intersect cost is a useful parameter, it is stored in a storage device for easy future retrieval of data for use in appropriately laying out the first set of potential routes for the first set of sub-region.

For reference purposes, the explanations given above in response to Claim 27 are called **[Response A]** hereinafter.

6. As to Claim 28, as explained in **[Response A]** given above that the edge-intersect cost of an edge is proportional to the number of potential routes that intersect that edge. Setting proportional constant to be 1, we have that the edge-intersect cost of a particular edge equals the number of potential routes that intersect the particular edge.

For reference purposes, the explanations given above in response to Claim 28 are called **[Response B]** hereinafter.

7. As to Claim 32, consider the sub-regions in the right portion of Fig. 19 as a second-set of sub-regions, and apply similar reasons as included in **[Response A]** given above to the second-set of sub-regions.

For reference purposes, the explanations given above in response to Claim 32 are called **[Response C]** hereinafter.

8. Claim 33, reasons are same as that included **[Response A]** in given above and using the following analogical facts between edges, paths and routes:

- each route contains a plurality of paths;
- each edge may be intersect by one route or a plurality of routes;
- each edge contains a path that is shared by a plurality of routes.

Applying the analogical facts given above, the following equivalences are true:

- path \leftrightarrow edge;
- (path-use \leftrightarrow edge-intersect) \Rightarrow (path-use cost \leftrightarrow edge-intersect cost)

For reference purposes, the explanations given above in response to Claim 33 are called **[Response D]** hereinafter.

9. As to Claim 34, reasons are included in **[Response D]** and **[Response B]** given above.
10. As to Claim 38, reasons are included in **[Response D]** and **[Response C]** given above.
11. As to Claim 39, reasons are included in **[Response A]** given above.
12. As to Claim 40, reasons are included in **[Response C]** given above.

Allowable Subject Matter

13. Claims 29 – 31 and 35 – 37 are objected to as being dependent upon a rejected base claim, but they would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Those claims are allowed is because that the prior art does not teach or fairly suggest the following subject matter recited in Claims 29 and 35:

- Identifying an edge-intersect probability for each particular edge, wherein the edge-intersect probability for each particular edge equals the number of potential routes of the first set of potential routes that intersect the particular edge divided by the number of routes in the first of potential routes in combination with limitations recited in Claim 29;
- Identifying a path-use probability for each particular path, wherein the path-use probability for each particular path equals the number of potential routes of the first set of potential routes that use the particular path divided by the

number of potential routes in the first set of potential routes in combination with limitations recited in Claim 29;

Response to Amendment and Remarks

14. Applicants' amendment and remarks filed on 02/09/2004 have been carefully reviewed. Applicant's arguments have been fully considered, but they are not persuasive. Key argument and response are list as below:

[Argument 1] A contact point is included within each sub-region – [Claimed 27 and 33]

[Response 1] Limitation in Claims 27 and 33 is – for a first set of sub-regions, wherein each sub-region of the first set includes a contact point. It means that each sub-region of the first set includes a contact point, which may be located at any location in a region occupied by the sub-region.

[Argument 2] Wang does not teach edge-intersect cost.

[Response 2] Wang teaches edge cost, which serves the same function as that of edge-intersect cost.

Detailed responses to the application are given above.

Notice that the application is examined based on the scope and clearness of limitations. In order to achieve fair and accurate examination and/or judgment, examiner sincerely requests applicants apply an accurate language and terms in description of limitations in a clear and precise fashion in view of specification and drawings they submitted.

Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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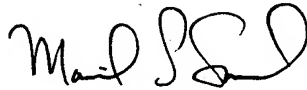
extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sun J. Lin whose telephone number is (571) 272-1899. The examiner can normally be reached on Monday-Friday (9:00AM-6:00PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 305-3413 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

Sun James Lin
Art Unit 2825
May 18, 2004


MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800